1-2013

2013 Update Mtg: Winter Moth and Cranberry! Scale Insects MRL's, Residues, and Restrictions

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UMass Cranberry Station Research Update
Plymouth, MA January 16, 2013

Winter Moth and Cranberry!
Scale Insects
MRL's, Residues, and Restrictions

3 Hot Topics

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Thanks to
Robert D. Childs and Joe Elkington
Plant, Soil, and Insect Sciences Dept.
University of Massachusetts, Amherst

Life Cycle

Eggs over-winter, larvae hatch early spring - April

Larvae feed all spring and pupate in late May

Pupae in soil all summer and fall until adult emergence

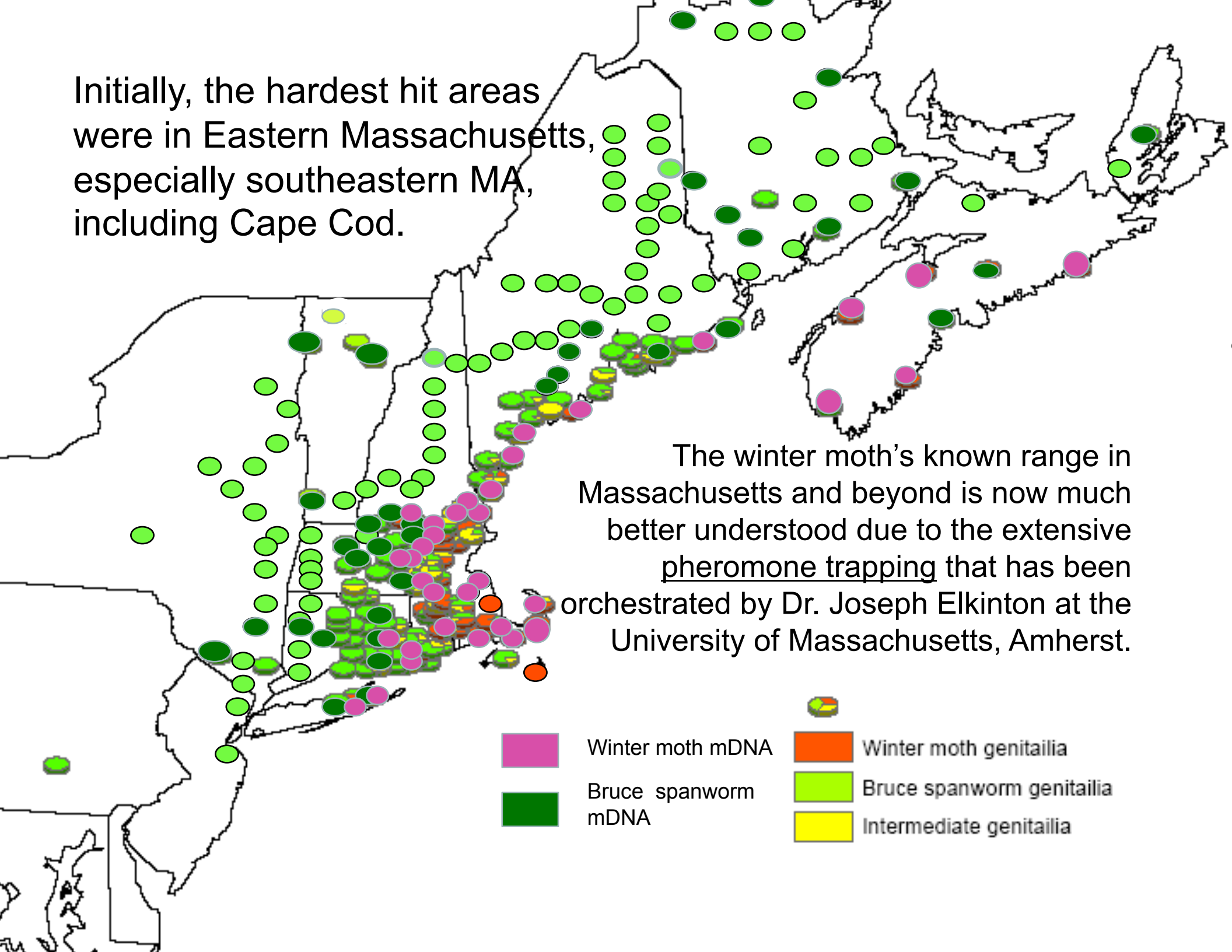
Adults emerge November-December, mate, lay eggs and die

Slide courtesy of Dr. Joseph Elkinton

Winter Moth: where did it come from?

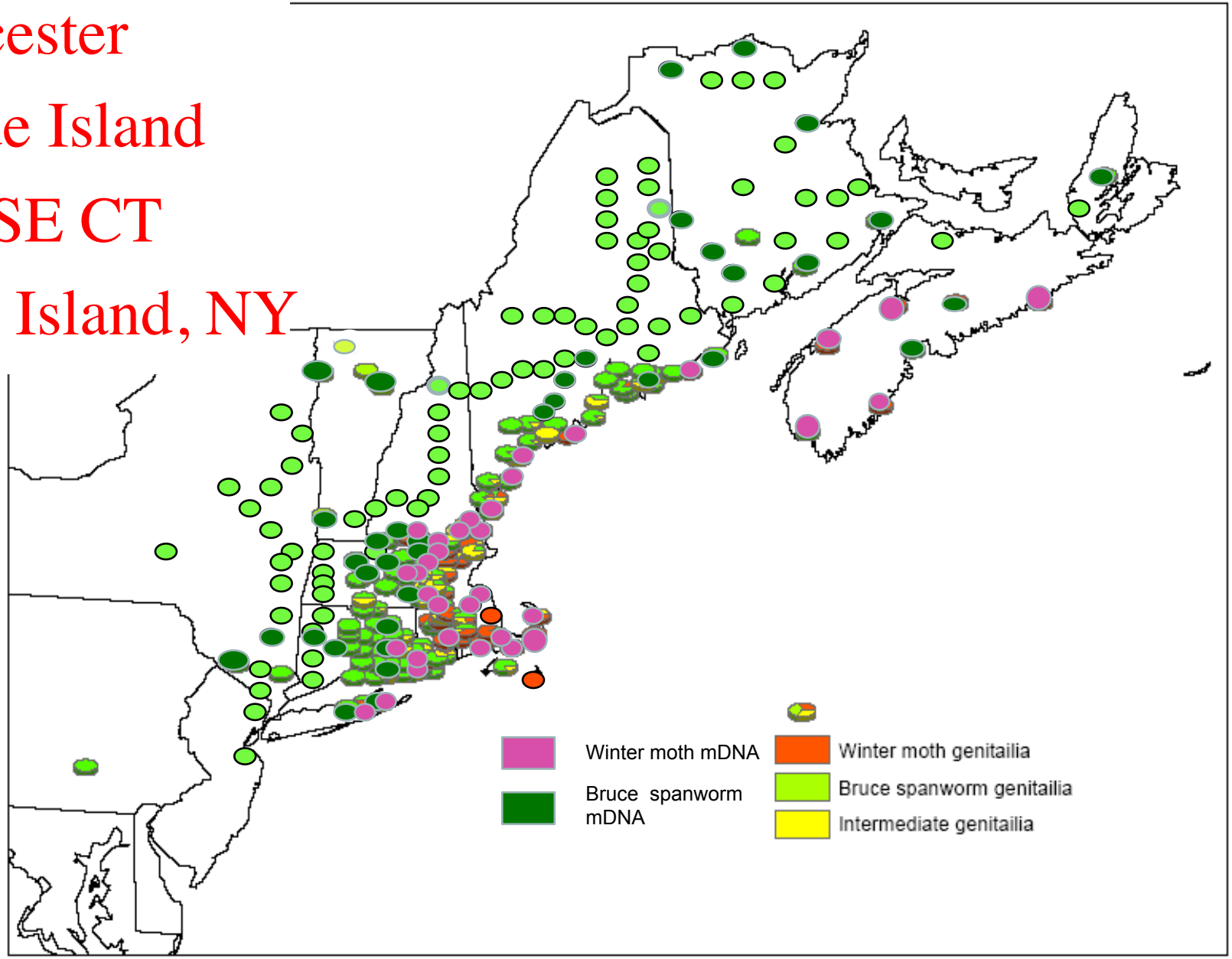
- **Native to Europe**
  - **including England**
- **Has been in Nova Scotia for decades**
  - **(1949) in apples and oaks**
- **British Columbia (Vancouver 1976)**
- **Only other finds in USA:**
  - **Washington state and Oregon**
  - **in commercial blueberries**
- **Now, well-established in eastern MA and RI**

Initially, the hardest hit areas were in Eastern Massachusetts, especially southeastern MA, including Cape Cod.



The winter moth's known range in Massachusetts and beyond is now much better understood due to the extensive pheromone trapping that has been orchestrated by Dr. Joseph Elkinton at the University of Massachusetts, Amherst.

- Cranberryland
- Worcester
- Rhode Island
- NH, SE CT
- Long Island, NY



Potential Host Plants

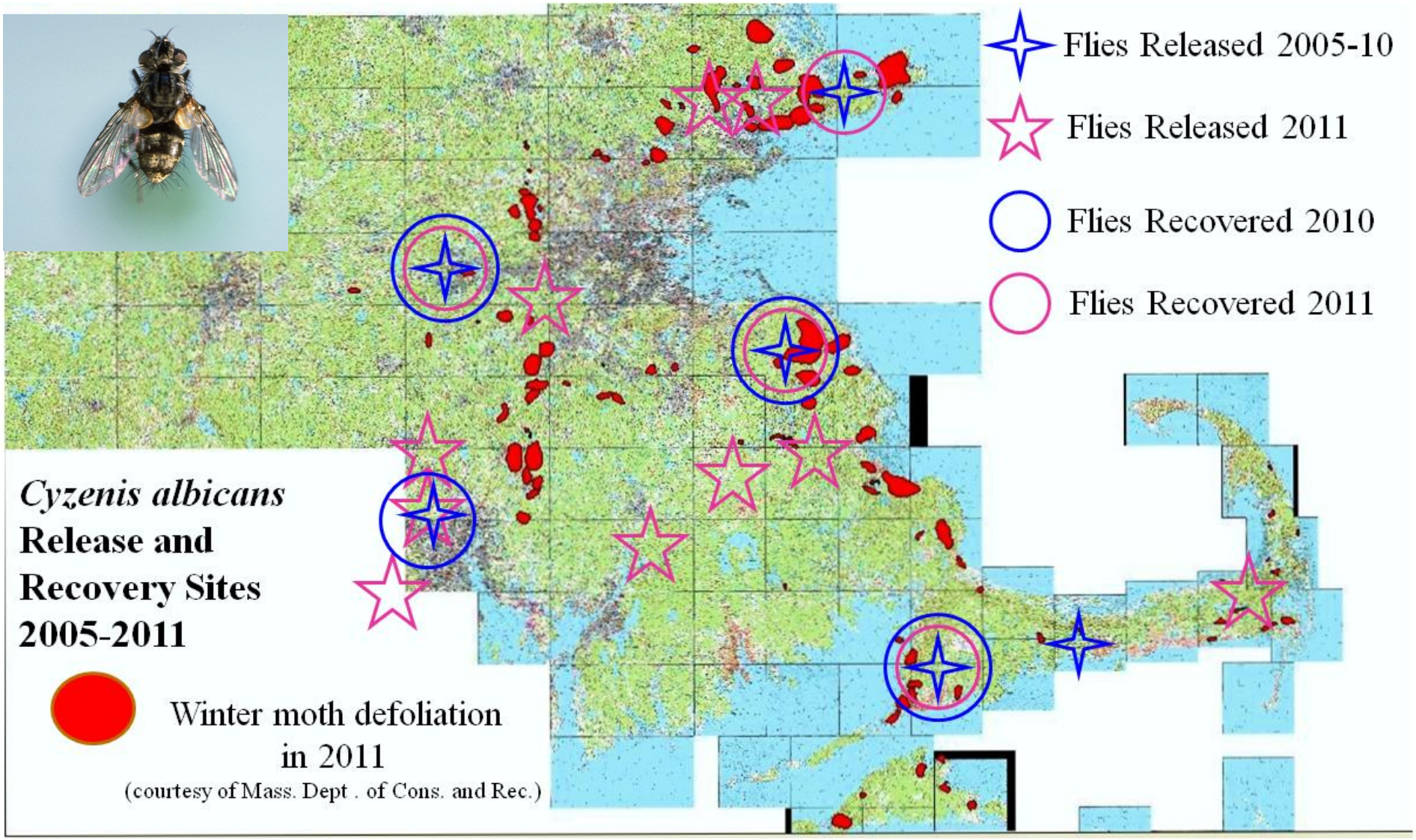
Winter Moth

- Oaks
- Maples
- Birches
- Crabapples
- Apple
- Blueberry
- Cranberry…

- Polyphagous (feed on many host plants)

Cyzenis albican

- A parasitic fly specific only to winter moth
- The fly sprays tiny “micro-eggs” on leaves that are eaten by the winter moth caterpillar during the spring.
- When the eggs are consumed, along with leaves, the eggs hatch inside the caterpillar and the larvae consume the caterpillar from within, eventually causing the moth to die.
- The fly pupates inside the carcass of the caterpillar and, the following spring, emerges as an adult fly to mate and begin the cycle again

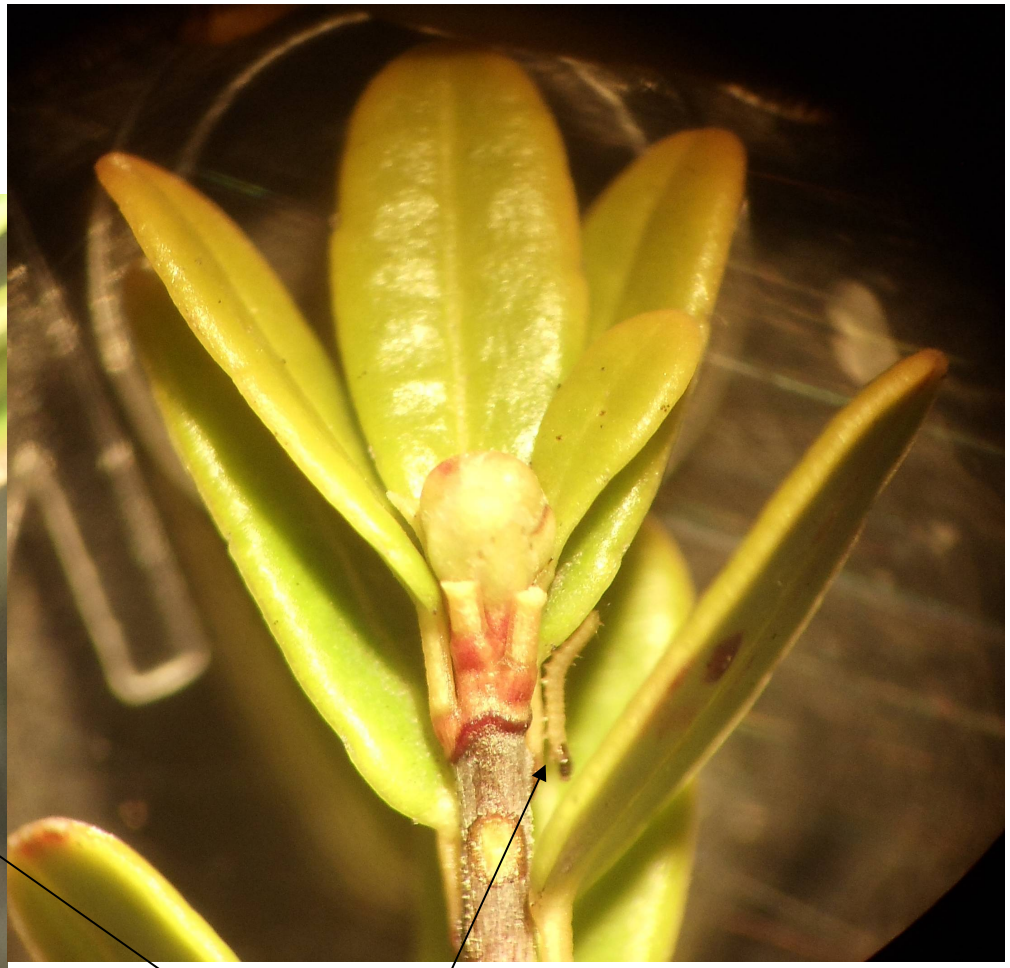

Flies Released 2005-10
Flies Released 2011
Flies Recovered 2010
Flies Recovered 2011
Cyzenis albicans
Release and
Recovery Sites
2005-2011
Winter moth defoliation
in 2011
(courtesy of Mass. Dept . of Cons. and Rec.)

Parasite Update

- Joe Elkinton (UMass Amherst)
- showing effectiveness
- based on experiences in maritime Canada
- Expected crash in population…

- BUT, in the meantime….
- Growers need to manage winter moth


4/5/12
BHF
OR
WM
??
BB
CB



UNDER THE MICROSCOPE – 2 MM

SPRING 2012

MARCH

FROST BEGINS

Winter Moth on BB

APRIL

BLUR OF FROST

Found on CB

MAY

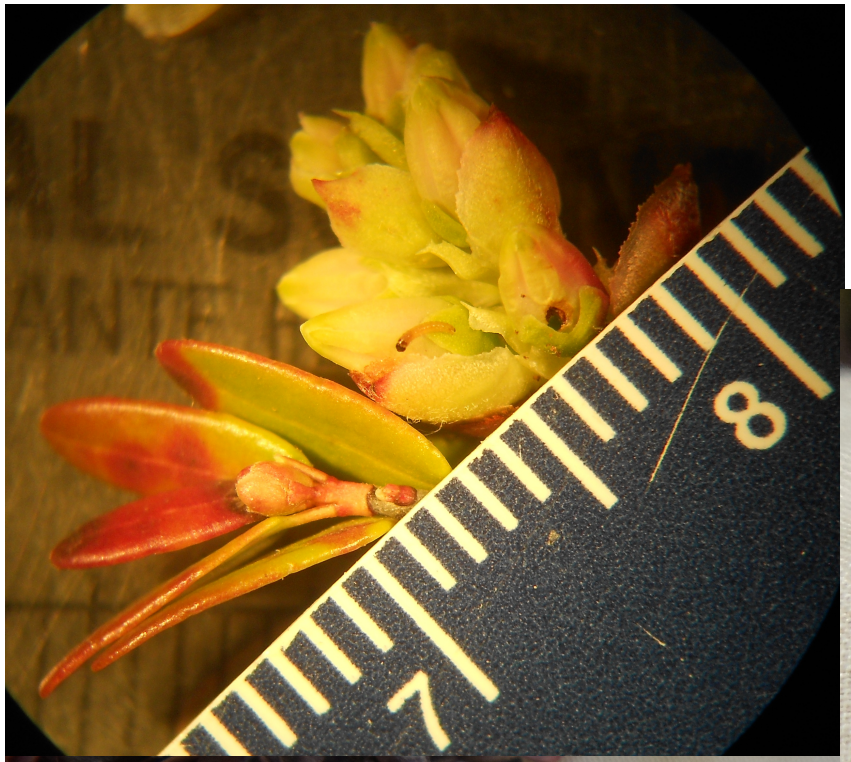
Winter Moth on CB

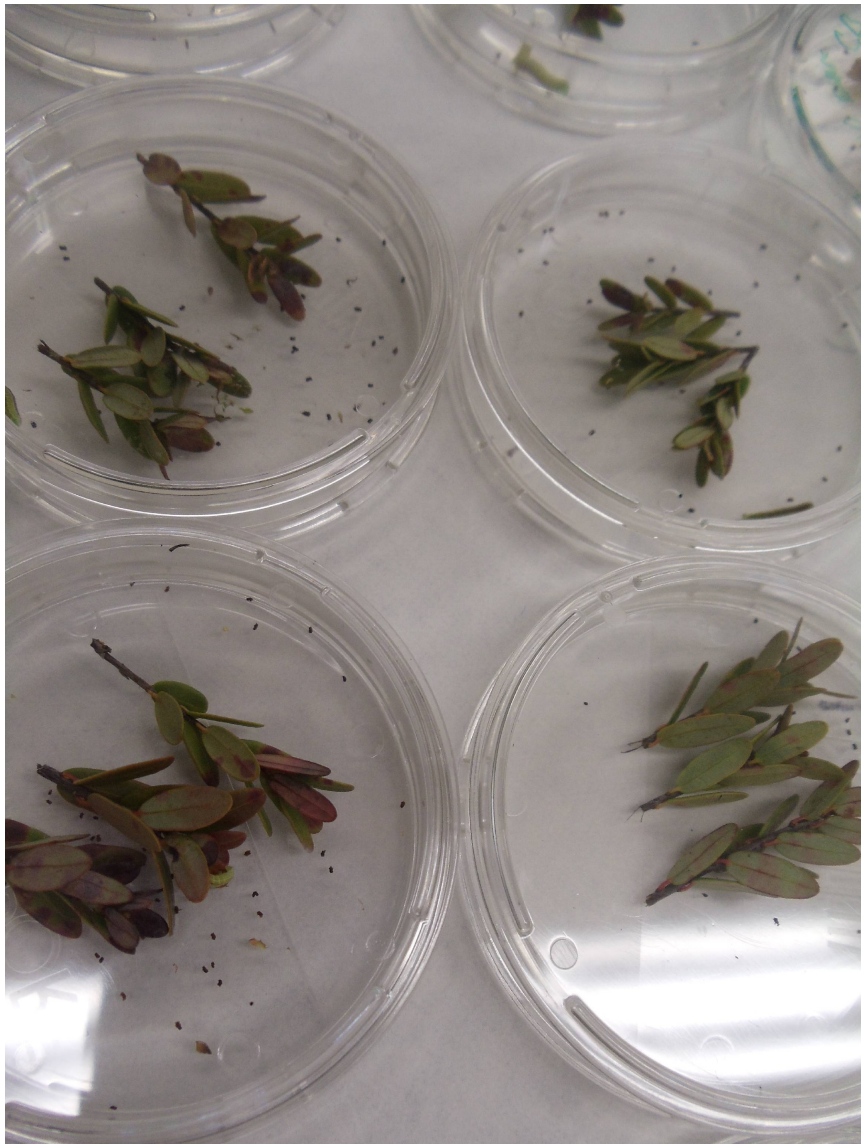
Collected on CB

Most have pupated


4/27/12

4/27/12 range in size
2mm - 15mm

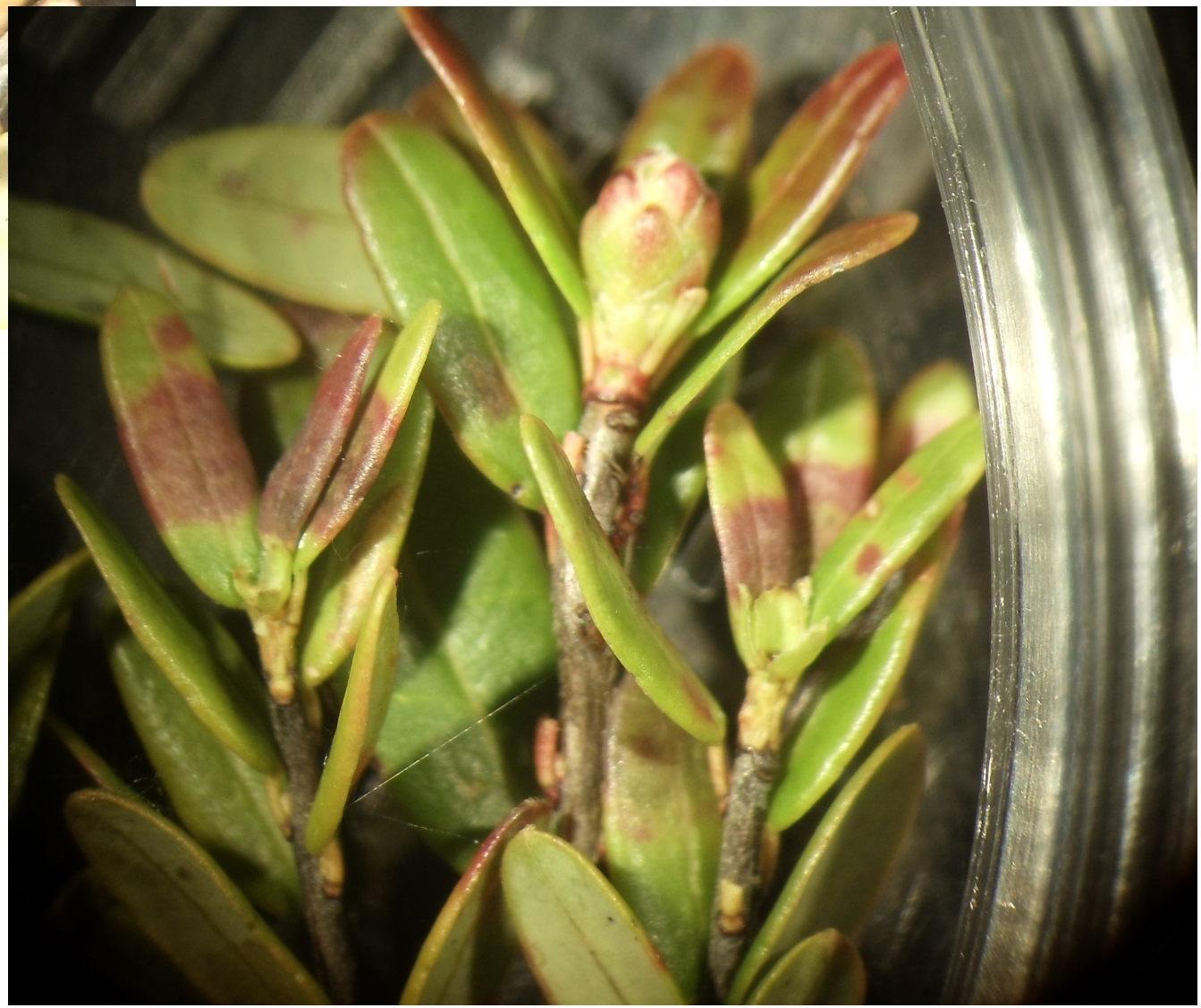


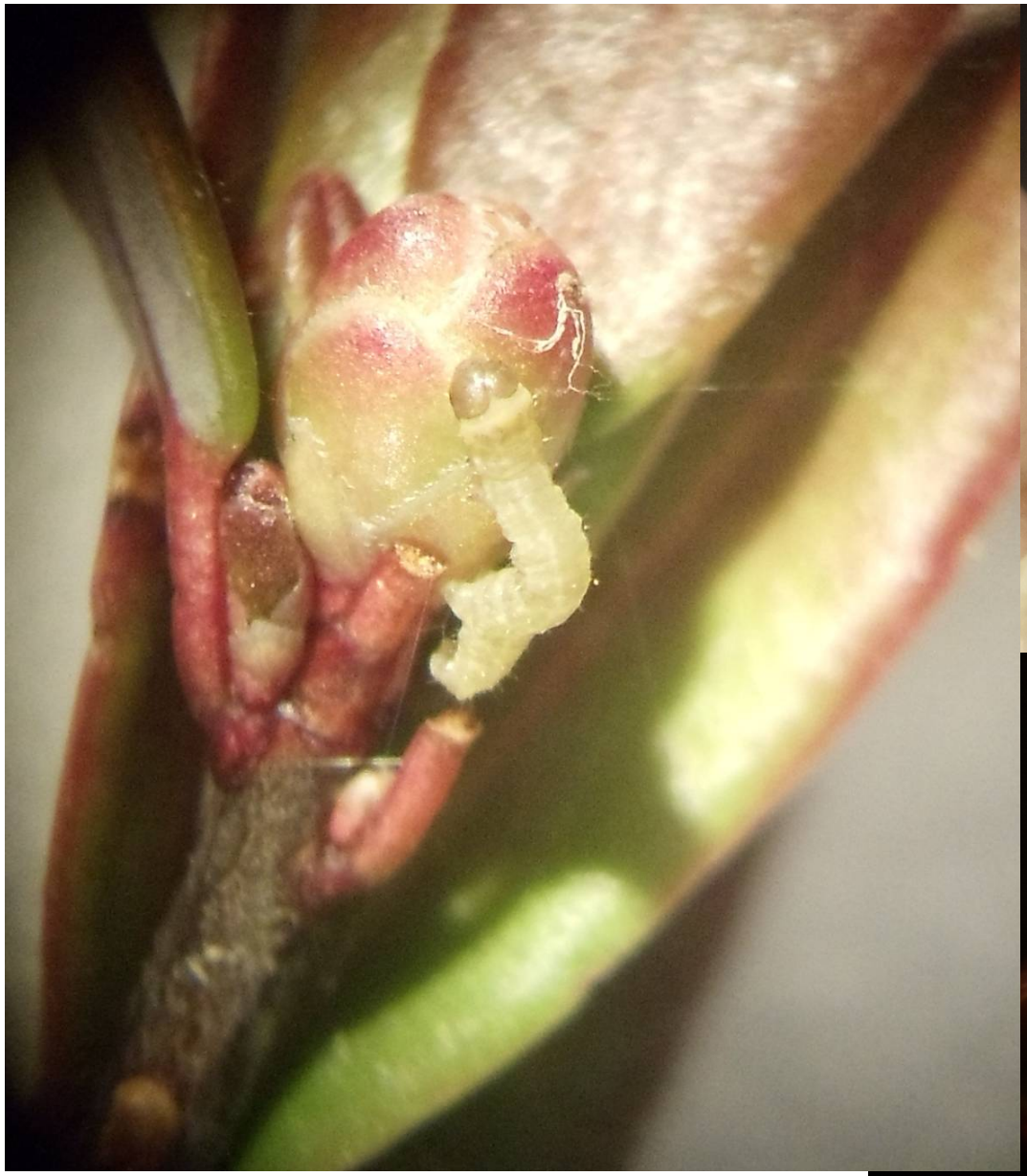


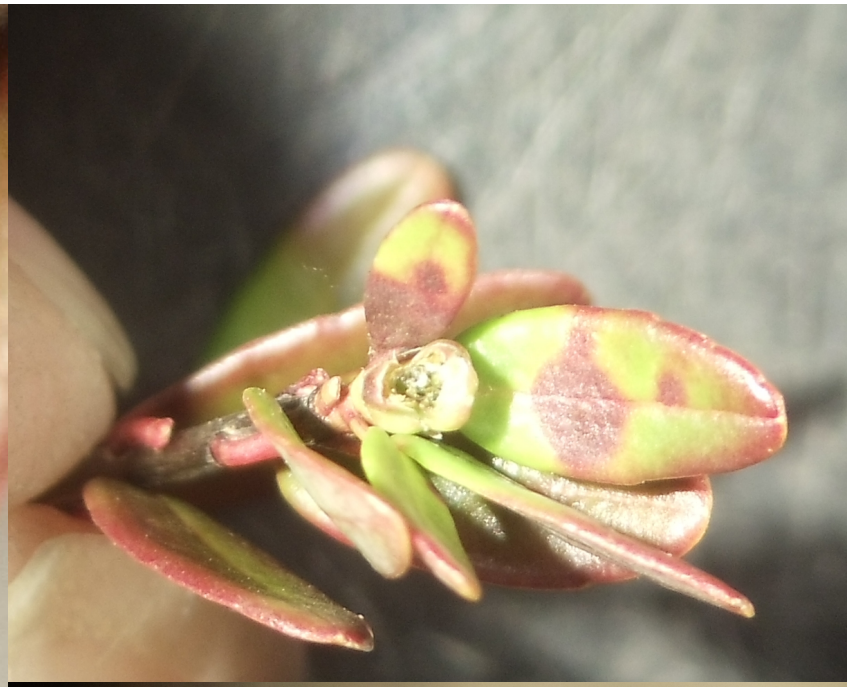
Winter Moth
"Cranberry Eating Trial"

EAT	SIZE		4/27-30		4/30-5/1	
1 bud	mm	2	4	2 dead	0	
		4	6	2 dead	3	2 dead
2 buds	¼"	6	9	1 dead	8	
		8	10	1 dead	7	
3 buds		10	3		9	
	½"	12+	2		8	

Where’s the bud?







In the lab

In the field

End of April, beginning of May

Medium Dunkin Donuts coffee cup

WINTER MOTH Management

- Sampling is difficult
- Hard to detect when small
- Very similar to black-headed fireworm when tiny!
- Treat earlier than later!

Winter moth is a green spanworm.
Winter moth is an inchworm.
Winter moth is a geometrid.
Winter moth is ***Operophtera brumata.***

All effective:

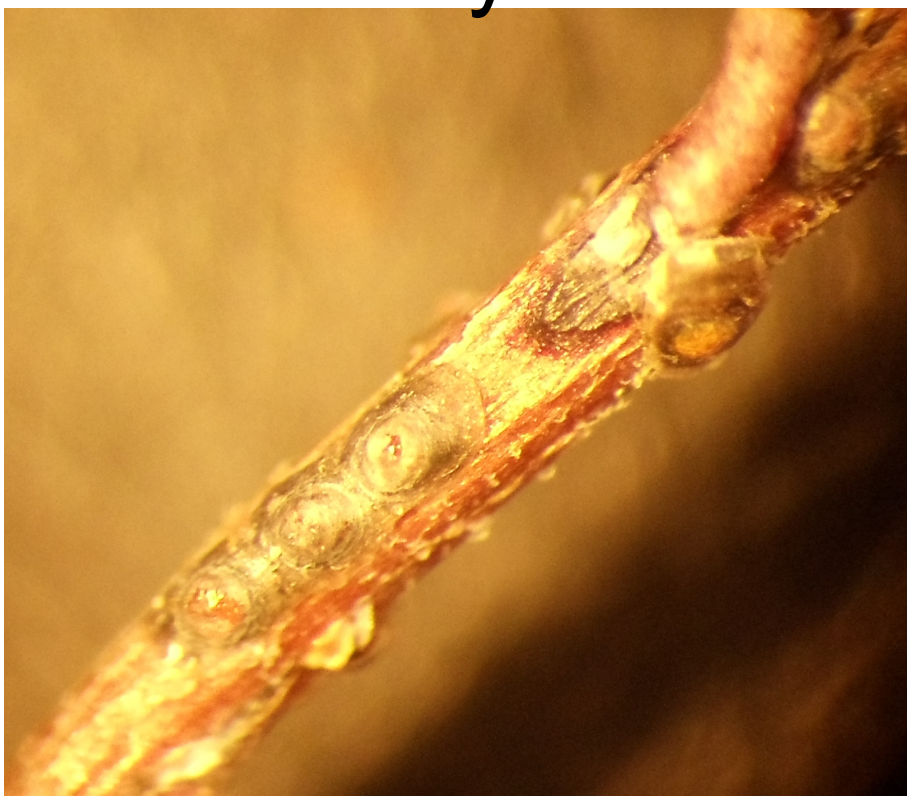
- **Intrepid**
- **Delegate**
- **Avaunt**

Scale Insects

- Two cases of out outbreaks in MA cranberry
  - 2 different species

Dearness Scale

Cranberry Scale



Scale Insects

- *Scale* are tiny parasitic *insects* that adhere to plants and live off the plant's sap
- They look like bumps on the plant's stem and are often mistaken for a disease

Scale Insects

- Adult female scale are immobile and permanently attach to the plant
- They secrete a waxy coating for defense that looks like a fish scale, thus the name

Scale Insects

- There are 2 kinds of scale
  - Armoured and soft bodied scales
- Most species of armored scales overwinter as eggs beneath the female cover

Armored scales

- Females produce eggs
- In spring, eggs hatch into tiny mobile crawlers which migrate to new feeding sites

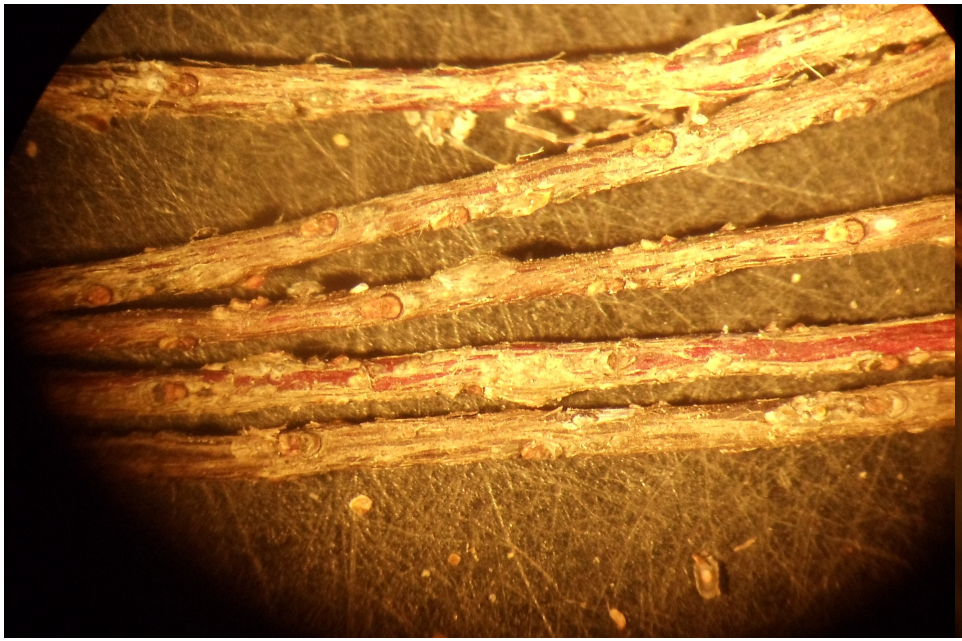
- Crawlers settle after a few days, insert their mouthparts in the plant, and begin to feed.
- They secrete a protective cover and lose their legs
- Large populations can build up before plants begin to show visible symptoms

San Jose Scale

- tree fruit pest
- most widely distributed and most destructive scale insect pest of fruit trees

Diaspidiotus perniciosus

- In 1952 Franklin reported 6 different species of scale insects in MA
- Reported in WI
  - 2005 Dearness Scale WI
- Reported in western growing regions
  - 2007 Dearness Scale BC



Dan Mahr, University of Wisconsin

DEARNESS SCALE

Common Name: Dearness scale
Scientific Name: *Rhizaspidiotus dearnessi*
Order: Homoptera (aphids, leafhoppers, spittlebugs, cicadas, mealybugs, scale insects)
Family: Diaspididae (the armored scales)

Dearness scale is a tiny, sedentary insect that sucks sap from the stems of cranberry plants. It is usually under good natural control from naturally occurring tiny parasitic wasps. On rare occasions outbreaks can occur. When populations are large, the vines turn red, the stems become brittle, and production is lost.

Biology and Damage

Host Plants:
Cranberry, *Vaccinium macrocarpon*
Common ragweed, *Ambrosia artemisifolia*
Goldenrod, *Solidago* spp.
Boneset, *Eupatorium perfoliatum*
Joe-pye weed, *Eupatorium maculatum*
Horseweed, *Erigeron canadensis*
Leatherleaf, *Chamaedaphne calyculata*
Bugleweed, *Lycopus virginicus*
Grass-leaved goldenrod, *Solidago graminifolia*, has been the most common weed host in Wisconsin cranberry beds.

Description and Diagnosis:
The eggs are retained internally by the female, which gives birth to live young. The young "crawlers" are bright orange, oblong, very tiny – initially 0.25 mm - 0.33 mm, and mobile. After molting to the second instar, the female dearness scales remain stationary for the rest of their lives. A white protective wax coating is secreted and eventually mixes with the cast off skins after future moltings to cover the insect's body. It is unclear as to how many instars there are but the male dearness scale shell elongates while the female shell remains oval. The adult males are winged, white, elongate, 1.0 mm long, have well developed legs and antennae, and are free living. The females are wingless, pale gray, oval, 2.0 mm long, do not have eyes or legs, and are immobile, staying under their scale coverings. Heavily infested plants have numerous small white scales along the stems, which are easily seen against the dark background of the bark. By using a pin, the white upper scale covering can be lifted off, revealing the sac-like body of the insect within. There is also a lower scale covering attached to the plant, thereby giving the appearance of a tiny clam shell.

Dearness scale on cranberry stem.

1971 Wisconsin

- Crawlers, newly hatched and mobile immatures of the scale, active mid-June
- Stagger emergence to late June
- Tiny orange/yellow crawlers disperse
- Settles, begins feeding, produces new shell in 2-4 days

Management

- Dormant oils suffocate scales
- Growth regulator possibilities
- New tipworm compound should hit scale

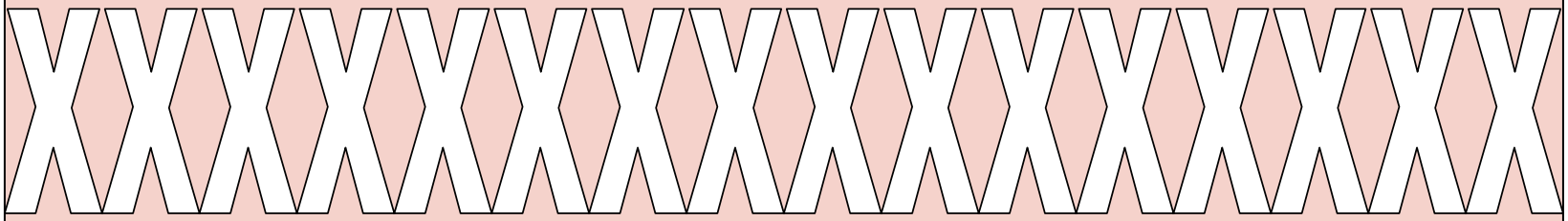
Management

- Scale insects' waxy covering makes them quite resistant to pesticides, which are only effective against the first-instar nymph *crawler* stage.

IN JUNE DURING BLOOM

- DIAZINON
- LORSBAN

MRL's, Residues, and Restrictions



Marty Sylvia

UMass Cranberry Station

What are MRL's

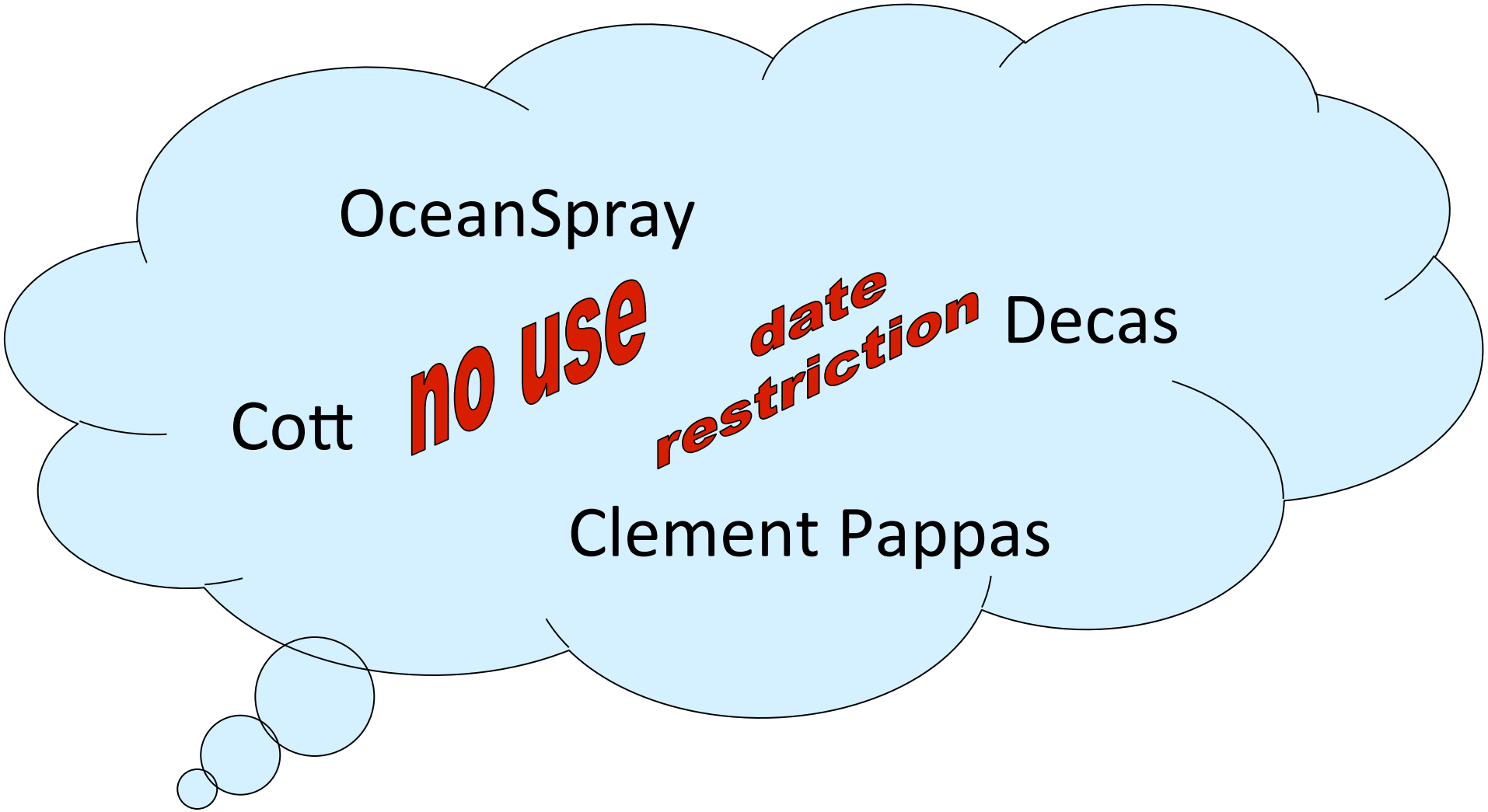
- MRL = Maximum Residue Limits (MRL)
- Same as tolerance but in foreign countries
  - Amount of residue that is ok on harvested crop
  - number expressed in parts per million (ppm)
- US Market vs International Markets

What's being done?

- CMC subcommittee
  - Identifies important compounds from a list of those that are not harmonized
  - CI, CMC, Researcher and Handlers
- CMC hired Bryant Christie Inc.
  - "Bryant Christie Inc. helps companies and organizations open, access, and expand international markets. We focus on the agricultural, food, and beverage sectors."
  - works on the political negotiations to achieve harmonization

Handlers have implemented restrictions

Domestic vs Export Fruit



Restrictions 2012

- OS, All MA = Export Processed = Incentive
- BUT Many Restrictions
  - No Quinclorac or Princep
  - No Maneb
  - No Belay
  - No Oberon, Rimon or Assail
  - No Orthene or Lorsban after 6/22
  - No Bravo or Altacor after 7/15
  - No Sevin after 8/1

Expected Restrictions

- No Quinstar (quinclorac), but US ok!
- No Belay (clothianidin)
- No Oberon, Evito, Rimon or Assail

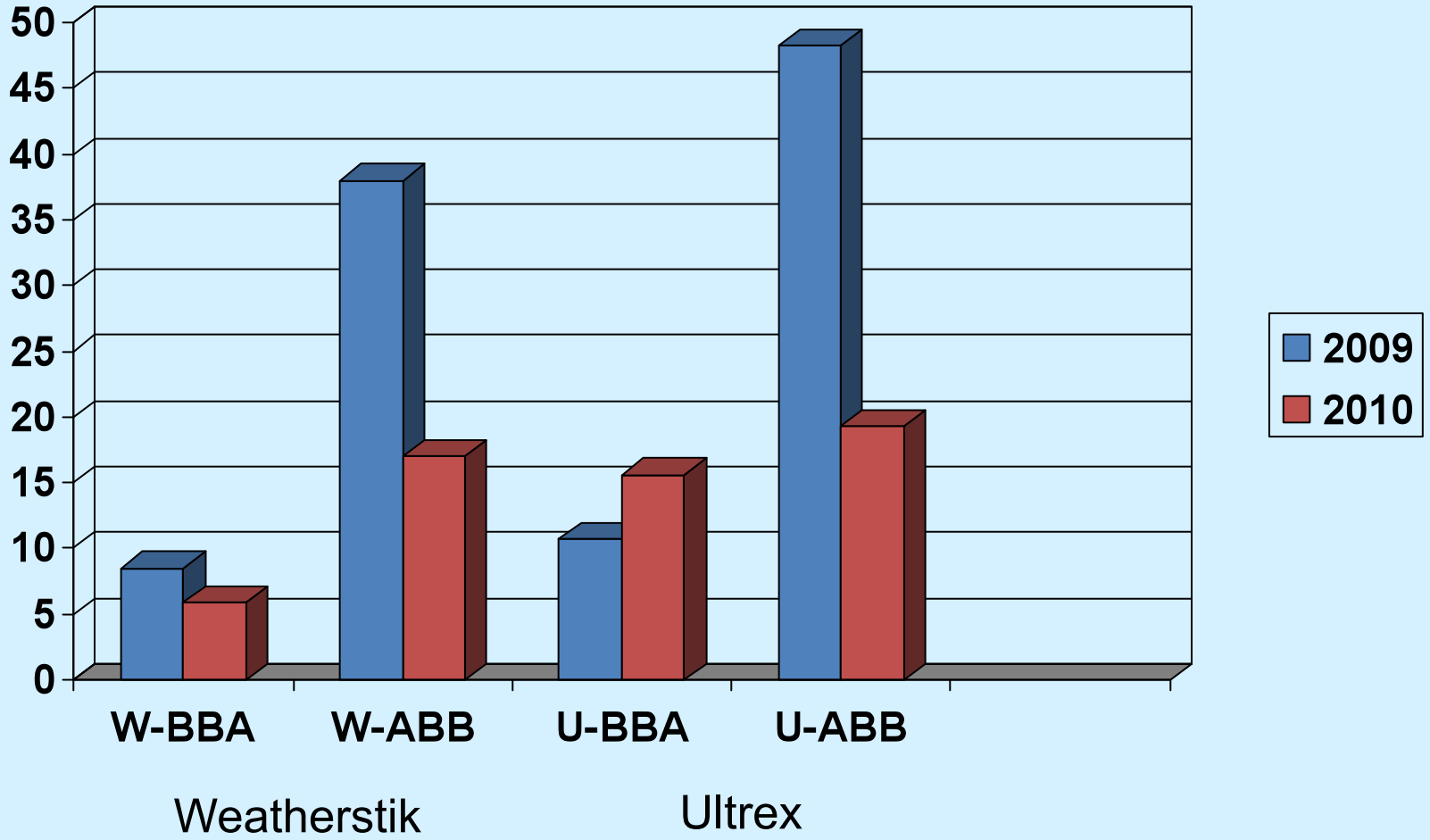
- No Orthene after 6/22
- No Lorsban after 6/22
- No Altacor after 7/15
- No Bravo after 7/15 or 8/1
- No Sevin (carbaryl) after 8/1

- Princep (simazine) gone
- Maneb gone
- Guthion (azinphos methyl) gone

Stable Persistent Compounds

- Casoron (dichlobenil)
  - Breakdown product Dichlorobenzamide (BAM)
  - In water supplies soils for years
- Sevin (carbaryl)
  - Multiple breakdown product detected for months
  - No Sevin after 8/1
- Belay (clothianidin)
  - Neonicotinoid blamed for CCD in Europe
- Quinstar (quinclorac)
  - MRL 0.05 ppm, US 1.5ppm
- Bravo (chlorothalonil)
  - No Bravo after 7/15, use for first sprays
- Altacor (chlorantraniliprole)
  - No Altacor after 7/15, use for early fruitworm sprays

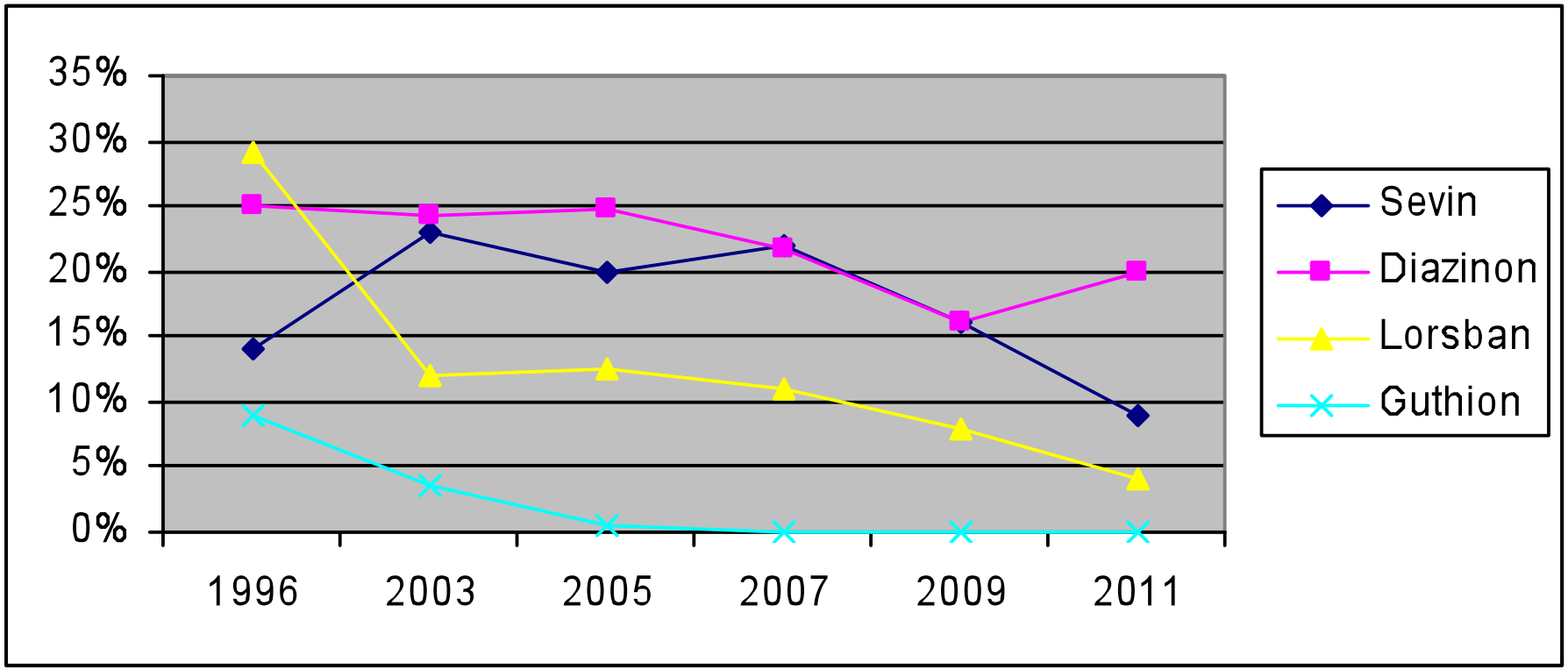
Chlorothalonil residues in 2009-10 field plots – two Bravo applications (ppb)



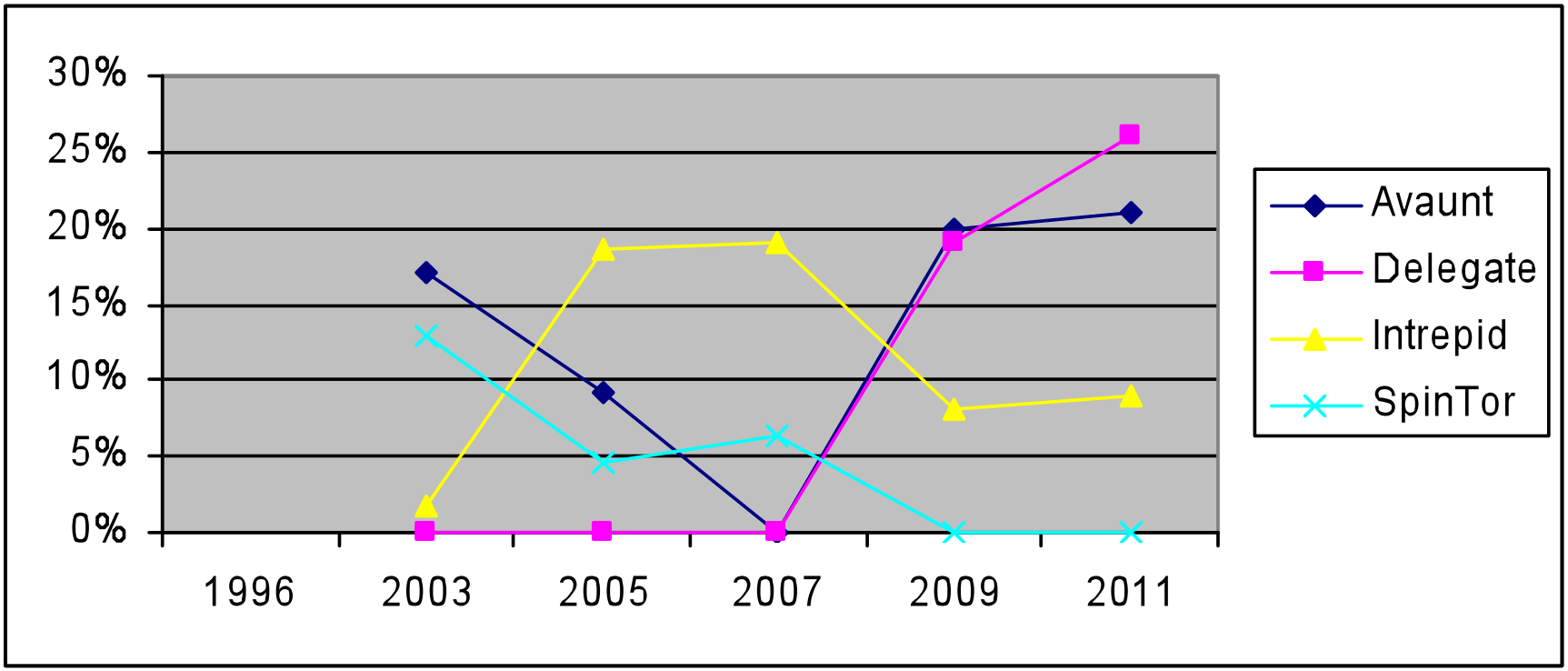
Recommendations

- Use chlorothalonil for earlier (1,2) applications
- Earlier (1,2) applications will result is less residue on the fruit
- Do NOT use for 3rd or later applications

Organophosphate and Carbamate Usage



New Compound Adoption



USDA Agricultural Marketing Service

USDA AMS Pesticide Data Program - 2006.

Fresh Fruit and Vegetables

Crop (e.g.)	N	Detect %	# Pesticides
Bananas	742	76	15
Broccoli	185	88	17
Carrots	744	84	21
Cranberries	316	69	12
Peaches	90	99	33
Watermelon	550	25	25
All Crops	6,433	64	

Cranberry Industry Fresh Fruit Pesticide Analysis.

	Percent of Samples with Detects			
	MA	WA	WI	Overall
Diazinon	0%	33%	0%	7%
Lorsban	37%	38%	9%	25%
Orthene	0%	17%	6%	6%
Bravo	82%	71%	47%	64%
Carbaryl	61%	0%	11%	26%
EBDC	26%	46%	15%	26%

Pesticide Residues Found in Cranberries, 2006:

N=77

What Pesticide?	How Often is it Found?	Toxicity
Chlorothalonil BRAVO	56%	carcinogen
1-Naphthol SEVIN metabolite	48%	hormone disruptor
Azoxystrobin ABOUND	32%	
Acephate ORTHENE	25%	possible carcinogen neurotoxins hormone disruptor
Chlorpyrifos LORSBAN	23%	
Methamidophos ORTHENE metabolite	16%	
Pronamide KERB	5%	
Carbaryl SEVIN	4%	

What's on my food? http://whatsonmyfood.org/food.jsp?food=CA

Conclusions

- Use Bravo early, not late
- Delegate and Altacor are options for CFW management
- Diazinon, not Sevin
- If you must use Quinstar, make sure your handler knows you did
- Know your handlers restrictions!